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Chromosome Cytology and Taxonomy of the Red Goblet-Flowered
Species of *Clidemia* (Melastomataceae: Miconieae) in
Central and South America

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ABSTRACT. *Clidemia clandestina* (Melastomataceae) of Costa Rica and Panama is newly described as part of a review of the goblet-flowered species from tropical America. This natural group of three species, including *C. garciabarrigae* and *C. utleyana*, is characterized by 5-merous flowers that are goblet-shaped in profile view with erect red petals that are connivent and cucullate at anthesis, minute anther thecae with wide ventrally inclined apical pores, and a completely inferior 3-locular ovary. An original chromosome count of $n = 17$ is reported for *C. utleyana*, and a count of $n = 23$ is reported for *C. clandestina* and *C. garciabarrigae*. The significance of these chromosome numbers is evaluated in the context of previous reports for the tribe Miconieae together with a diagnostic key, descriptions, illustrations, new distributional information, phenological notes, and citations of representative specimens.

Key words: Central America, chromosome cytology, *Clidemia*, Melastomataceae, Miconieae, red goblet-flowered species, South America.

Clidemia D. Don sensu lato, a berry-fruited genus of Melastomataceae with over 170 species, is diverse and widespread in the American tropics but still little-known and undercollected in several parts of its range. The three species treated here are collectively distributed from Costa Rica and Panama disjunctly south to Colombia and northwestern Ecuador where they occur in some of the wettest environments of the two contiguous biodi-

versity hot spots in the region (Mittermeier et al., 1999). They constitute a distinctive assemblage characterized by their scandent or reclining (sometimes epiphytic) habit, completely inferior 3-locular ovary, 5-merous flowers that are goblet-shaped in profile view (Figs. 2D, 3D) with unusual red petals that are erect, connivent, and conspicuously concave at anthesis (Figs. 2E, 3H). In addition, the anther thecae are minute, incurved, and have comparatively wide ventrally inclined apical pores. A taxonomic account of this species group is presented to facilitate the description of *C. clandestina* from Costa Rica and Panama and to provide the first chromosome information for each of the three species.

CHROMOSOME CYTOLOGY

The first gametic chromosome number reports are presented here for one population each of *C. clandestina*, *C. garciabarrigae*, and *C. utleyana*. Although some pollen mother cells of both *C. clandestina* and *C. garciabarrigae* showed some lagging chromosomes, meiosis for the most part appeared to be regular with $n = 23$ for the few cells examined (Fig. 1A–1C). In *C. utleyana* meiosis was consistently regular with $n = 17$ in all cells examined (Fig. 1D). Bud material for these counts was collected from natural populations in the field, fixed in modified Carnoy's solution (4 chloroform, 3 ethanol, 1 glacial acetic acid, v/v/v, Bradley, 1948), transferred to 70% ethanol, and stored under refrigeration. All counts were made with a Zeiss light

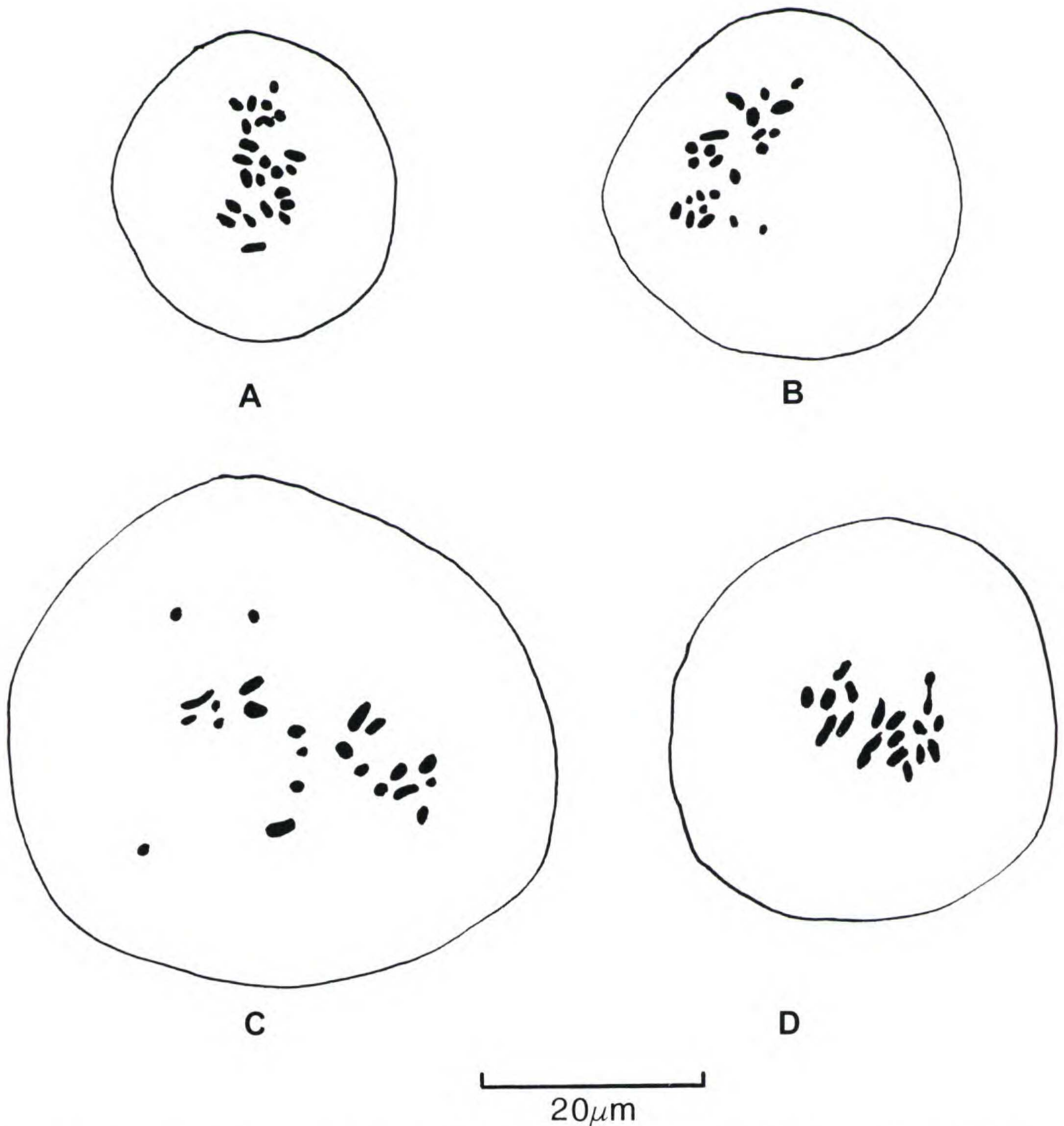


Figure 1. Camera lucida drawings of meiotic chromosome figures of *Clidemia*.—A, B. *C. clandestina*, $n = 23$, metaphase I (Almeda *et al.* 5907). —C. *C. garciabarrigae*, $n = 23$, metaphase I (Almeda *et al.* 7504). —D. *C. utleyana*, $n = 17$, metaphase I (Almeda *et al.* 6864).

microscope with phase contrast and a $100\times$ oil immersion objective. Drawings of meiotic figures were made with camera lucida at a magnification of $2100\times$. Voucher collections for the counts reported here are marked with an asterisk among the specimens cited.

The count of $n = 17$, reported here for *C. utleyana*, is the most commonly reported gametic chromosome number in the tribe Miconieae and appears to be the base number for *Clidemia* and several related genera (Almeda & Chuang, 1992; Solt & Wurdack, 1980). Ten of the 14 genera in the Miconieae investigated to date have $x = 17$ and the

other four genera have $n = 15, 20, 28$, and other numbers that can best be interpreted as dysploid derivatives of polyploid numbers (Almeda, 1997a). Almeda and Chuang (1992) speculated that $n = 17$ may have arisen as a dysploid derivative of an autotetraploid based on $x = 9$ or by ancient hybridization of species with 7 and 10 or 8 and 9 haploid chromosome numbers. Because chromosome numbers ranging from $x = 9$ through $x = 12$ are known for several genera in the Melastomataceae and several families in the Myrtales (Almeda, 1997a, 1997b), it is likely that some number in this range is the original base chromosome number in the

family. Thus, a polyploid origin for the Miconieae is clearly indicated, but unlike other tribes in the family, the Miconieae appear to have no extant taxa with lower base numbers that could qualify as ancestral base numbers (Almeda, 1997a).

Goldenberg and Shepherd (1998) demonstrated a close association between high chromosome number (above $n = 17$), low but highly variable pollen viability, and apomixis. Gametic chromosome counts of $n = 23$ and 24 have been reported for several species of *Clidemia* and *Miconia* (Almeda, 1997a; Almeda & Chuang, 1992; Solt & Wurdack, 1980), and those species with these higher numbers that have been investigated experimentally have been shown to be apomictic (Goldenberg & Shepherd, 1998). Apomixis has been reported or suspected in several species of Melastomataceae, a majority of which are concentrated in the tribe Miconieae (Almeda & Chuang, 1992; Goldenberg & Shepherd, 1998; Renner, 1989).

Access to good anthers with pollen was limited for most goblet-flowered species of *Clidemia* examined for this study. Pollen viability estimated for one individual of each species (based on a sample of 200 grains stained with aniline blue in lactophenol for 24 hrs.) was 51% for *C. utleyana* (Almeda 6864), 0% for *C. clandestina* (Croat 67238), and 5% for *C. garciabarrigae* (Øllgaard 37666). Judging from the extremely low pollen viability for the latter two species coupled with their higher chromosome number ($n = 23$), one may logically predict that they are also apomictic. Study of additional populations and emasculation experiments are needed, however, for all of the taxa treated here in order to confirm the occurrence of apomixis and to better evaluate any morphological, cytological, or environmental correlates with this breeding system.

KEY TO THE RED GOBLET-FLOWERED SPECIES OF
CLIDEMIA

- 1a. Leaf blades glabrous on the adaxial (upper) surface; inflorescence a multibranching panicle; bracts and bracteoles of the inflorescence widest at the base.
- 2a. Leaf blades essentially flat on the adaxial surface; abaxial (lower) surface with spreading smooth hairs restricted to the blade base where the primary veins diverge from the median vein; hypanthia minutely and deciduously brown-lepidote; petals copiously covered with minute papillae on both surfaces *C. clandestina*
- 2b. Leaf blades bullate on the adaxial surface; abaxial leaf surface with smooth spreading hairs covering all the elevated veins and veinlets; hypanthia sparsely to moderately covered with smooth spreading hairs and a ground layer of scattered minute glandular-

- punctate hairs; petals completely smooth on both surfaces *C. utleyana*
- 1b. Leaf blades pubescent on the adaxial surface; inflorescence a solitary or trifurcate collection of racemes; bracts and bracteoles of the inflorescence widest above the base *C. garciabarrigae*

1. *Clidemia clandestina* Almeda, sp. nov. TYPE: Panama. Coclé: Cerro Gaital, E slope and ridges leading to the summit with montane rainforest and elfin woodland, 8°40'N, 80°07'W, elev. 1050–1100 m, 24 Feb. 1988, F. Almeda et al. 5907* (holotype, CAS; isotypes, AAU, CR, INB, MEXU, MO, NY, PMA). Figure 2.

Frutex terrestris vel epiphyticus. Ramuli primum quadrangulati demum teretes glabri. Lamina 5.7–14 × 3–7.3 cm elliptica vel elliptico-ovata apice acuminato vel caudato-acuminato basi obtusa vel rotundata, 3–5-plinervata, supra glabra, subtus in venarum primariarum axillis (et supra axillis) modice setosa pilis simplicibus 0.5–1 mm longis persistentibus. Inflorescentia 3–8.5 cm multiflora; flores 5-meri; calycis tubus 0.1–0.25 mm altus, lobis interioribus 0.25 × 0.5 mm triangularibus, dentibus exterioribus subulatis 0.25–0.5 mm eminentibus. Stamina isomorphica glabra; antherarum thecae 0.25 × 0.25 mm oblongae exappendiculatae, poro ventraliter inclinato. Ovarium 3-loculare et omnino inferum apice glabro.

Erect or scandent terrestrial shrub 1–2.5 m tall or dangling epiphyte. Internodes ± quadrate, becoming rounded with age, and sometimes bearing adventitious roots but otherwise essentially glabrous. Young vegetative buds, pedicels, and hypanthia minutely and caducously brown lepidote. Leaves of a pair ± equal in length or somewhat unequal but never markedly so; petioles 0.6–1.5 cm long; blades ± coriaceous when dry, 5.7–14 × 3–7.3 cm, elliptic sometimes varying to elliptic-ovate, apex acuminate to caudate-acuminate, base obtuse to rounded, margin entire to inconspicuously ciliate-serrulate, 3- to 5-plinerved with the innermost pair of primary veins diverging from the median vein 0.2–0.8 cm above the blade base, glabrous adaxially and moderately lepidote abaxially on the actual surface with hair-tuft domatia bearing hairs 0.5–1 mm long along the basal portion of the primary veins and where the innermost primaries diverge from the median veins at the blade base. Inflorescence a terminal modified dichasium 3–8.5 cm long becoming pseudolateral with elongation of lateral branches, sometimes divaricately branched from the base; bracts and bracteoles subulate to narrowly triangular, 0.5–1 mm long and about 0.25 mm wide at the base. Pedicels 0.5–1 mm long. Hypanthia (at anthesis) campanulate, ca. 1 mm long from the base to the vascular ring. Calyx tube 0.1–0.25 mm long, the calyx lobes 0.25 × 0.5 mm, bluntly triangular, hyaline and typically obscured

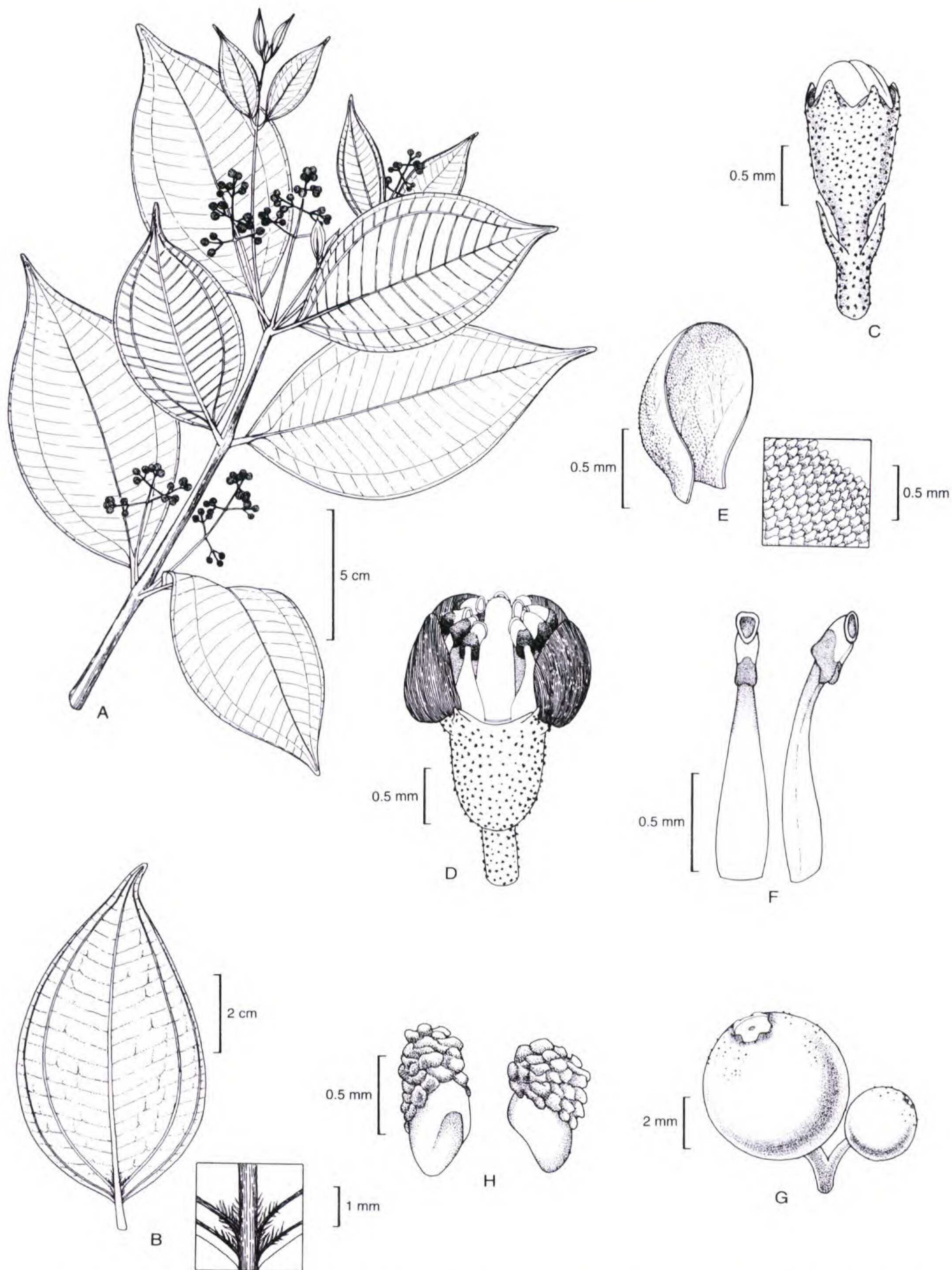


Figure 2. *Clidemia clandestina* Almeda. —A. Habit. —B. Representative leaf (abaxial surface) at left and leaf base (abaxial surface) at lower right. —C. Flower bud showing pedicel and subtending bracteoles. —D. Flower at anthesis (profile view) with one petal removed. —E. Petal (3/4 profile view) on left and enlargement of abaxial surface on right. —F. Stamens, ventral view on left and profile view on right. —G. Berries. —H. Seeds. (A–H from Almeda *et al.* 5907.)

by the exterior teeth; calyx teeth 5, linear to subulate, 0.25–0.5 mm long. Petals 5, copiously covered with minute papillae on both surfaces, dark red but drying maroon-black, obovate, erect and concave adaxially at anthesis, 1 mm long and 1 mm wide. Stamens 10, isomorphic and forming an incurved circle around the style; filaments glabrous, 1 mm long, gradually tapered from the base to the apex, pink but drying red; anthers 0.25 mm long and 0.25 mm wide, pale yellow flushed with crimson-maroon basally, \pm oblong, rounded at the apex with a ventrally inclined pore; connective crimson-maroon but drying purple-black, thickened at the base of the anther sac but not conspicuously prolonged or appendaged. Ovary completely inferior, 3-locular, apex glabrous. Style straight, glabrous, 1.25 mm long; stigma blunt and rounded to \pm truncate. Berry maroon when immature but turning purple-black when ripe, 4–5 \times 4–5 mm when dry. Seeds ovoid to obovoid in outline, 1 mm long, bluntly and complexly tuberculate on the convex face.

Phenology. Collected in flower and fruit during February, March, July, August, November, and December.

Distribution. Local and uncommon in rain forests, cloud forests, and elfin woodland from northern and central Costa Rica disjunctly to western and central Panama at 700–1400 m.

Although collections of this species were first made in 1979, followed by several more in the 1980s, none had intact floral parts for critical analysis. Like so many Melastomataceae, the floral parts of this species are especially fugacious and unless care is taken to press flowers separately or preserve them in alcohol they are commonly absent on herbarium specimens. Details of floral morphology presented here were discernable only after I had the opportunity to study and collect this species in Panama in 1996.

Clidemia clandestina is readily distinguished from *C. garciabarrigae* and *C. utleyana* by its glabrous internodes and leaf blades that are glabrous adaxially and moderately lepidote abaxially on the actual surface with tufts of smooth spreading hairs along the basal portion of the primary veins and where the innermost primaries diverge from the median veins at the blade base. In addition, the young vegetative buds, pedicels, and hypanthia are minutely and caducously brown lepidote and the petals are distinctly papillose on both surfaces. The flowers of *C. clandestina* are small, dark red in color, and inconspicuous. The inflorescences are typically shorter than subtending leaves and often as-

sume a position hidden under the blades. The specific epithet for this species, which is derived from the Latin word *clandestinus*, secret or hidden, emphasizes these features.

Paratypes. COSTA RICA. **Alajuela:** Cantón de San Ramón, Bosque Eterno de Los Niños, Cordillera de Tilarán, Valle del Río Peñas Blancas, 7 Oct. 1993, *Bello & Cruz 5364* (INB); Upala, Bijagua, El Pilón, Cabeceras del Río Celeste, 10°49'N, 84°27'W, 13 Nov. 1987, *Herrera 1263* (CAS, CR, MO); along road from San Ramón northward through Balsa, ca. 16.7 km N of bridge over Quebrada Volio and ca. 7.5 km N of bridge over Río Balsa, 10°10–15'N, 84°30–35'W, 29 Aug. 1979, *Stevens 13890* (CAS, CR, MO). **Limón:** Cantón de Talamanca, Bratsi, Amubri, Alto Lari, Kivat, bajando hacia el Río Dapari, margen derecha, 9°24'20"N, 83°05'35"W, 10 Mar. 1992, *Herrera 5280* (CAS, INB, MO); Cantón de Talamanca, Bratsi, Amubri, Alto Lari, Kivut, fila mayor entre los Ríos Dapari y Lari, desviándose hacia el este por fila secundaria, cuenca del Río Lari, 9°23'50"N, 83°05'10"W, 17 Mar. 1992, *Herrera 5383* (INB); Cantón de Talamanca, fila de exploración minera entre Río Sukut y Río Carbri, Cerro Schtomat, 9°22'40"N, 82°56'30"W, 13 July 1989, *Solís et al. 21* (INB). PANAMA. **Chiriquí:** Fortuna Dam area about 3.7 km S of the Sitio de Presa offices, trail through Quebrada Aleman, 9 Feb. 1996, *Almeda et al. 7565* (CAS, MO, PMA); Fortuna Dam area, North Quebrada de Arena along river, 8°46'N, 82°12'W, 9 Feb. 1984, *Churchill et al. 4709* (MO). **Coelé:** vicinity of La Mesa, N of El Valle de Antón, along E edge of Cerro Gaital on hogback ridge leading to summit, 8°37'N, 80°08'W, 13 July 1987, *Croat 67238* (CAS); Cerro Gaital, elfin forest, 8°37'N, 80°6'W, 26 Nov. 1984, *de Nevers & Charnley 4379* (CAS); slopes and summit of Cerro Gaital, N of El Valle, 8°40'N, 80°07'W, 10 July 1982, *Knapp et al. 6008* (CAS); Divide SW of La Mesa at end of logging road, 80°5'W, 8°35'N, 26 Dec. 1982, *Stein & Hamilton 998* (CAS, MO).

2. *Clidemia garciabarrigae* Wurdack, *Phytologia* 7: 239. 1960. TYPE: Colombia. Nariño: between Altaquer and Ricuarte along the road to Barbacoas, 1140–1300 m, 3–5 Aug. 1948, *H. Garcia-Barriga 13116* (holotype, US; isotype, COL). Figure 3.

Terrestrial or epiphytic weakly branched shrub with pendent or arching branches 1–2 m long typically requiring the support of adjacent vegetation. Internodes \pm terete and covered with smooth, eglandular, spreading hairs (0.5–)1–3 mm long like the inflorescence rachis and both foliar surfaces; the nodes \pm swollen. Leaves of a pair dimorphic in size and shape; blades subcoriaceous when dry, the larger one at each node, 6–10.2 \times 2–5.4 cm, ovate-elliptic to ovate-oblong, apex abruptly acuminate, base broadly rounded to subcordate, margin entire, 5-nerved or 5-plinerved, the innermost pair of primaries diverging from the median vein 2–3 mm above the blade base; petiole 3–5 mm long; the smaller blade 1.7–4.4 \times 1.5–3.6 cm, broadly ovate, apex short-apiculate, base cordate,

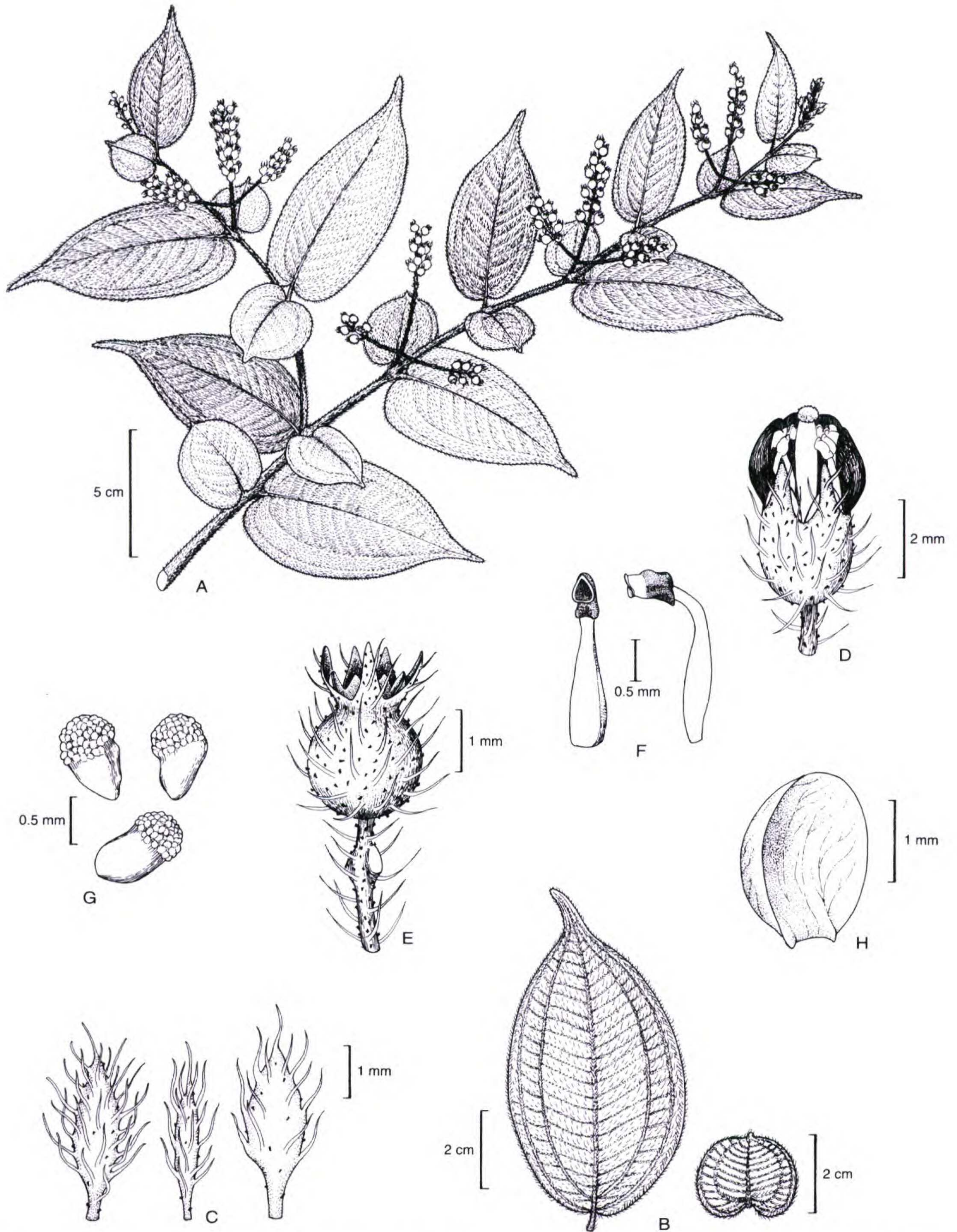


Figure 3. *Clidemia garciabarrigae* Wurdack. —A. Habit. —B. Representative leaves at a node, larger leaf showing abaxial surface (left) and smaller leaf showing abaxial surface (right). —C. Floral bracteoles (abaxial surfaces). —D. Flower at anthesis (profile view) with one petal removed. —E. Immature berry (profile view). —F. Stamens, ventral view on left and profile view on right. —G. Seeds. —H. Petal (3/4 profile view). (A, G from Hampshire & Whitefoord 738; B–F, H from Almeda *et al.* 7504.)

margin entire, 3–5-nerved, petiole barely prolonged and subsessile or up to 1 mm long. Inflorescence a trifurcate raceme or occasionally a solitary raceme 3.5–5 cm long that is at first terminal but becomes pseudolateral with elongation of lateral branches; bracteoles elliptic to linear-oblong or somewhat obovate, tardily deciduous, 2–4 × 0.25–2.5 mm, glabrous adaxially, sparsely to moderately covered abaxially with smooth spreading hairs and a sparse ground layer of small glands. Pedicels (at anthesis) 0.25–1 mm long. Hypanthia (at anthesis) campanulate to cupulate, 1–1.5 mm long from the base to the vascular ring, sparsely covered with smooth spreading hairs 0.5–1.5 mm long and a ground layer of scattered rusty-brown glandular hairs. Calyx tube obsolete, the calyx lobes 0.5–0.8 × 0.75 mm, rounded-triangular, somewhat hyaline and mostly obscured by the exterior teeth; calyx teeth 5, narrowly triangular, 1 × 0.75 mm. Petals 5, glabrous, dark red but drying maroon-black, suborbicular, erect, connivent and concave adaxially at anthesis, 1.5–2 × 1.5–2 mm. Stamens 10, isomorphic and forming an incurved circle around the style; filaments glabrous, 1–1.5 × 0.25 mm, gradually tapered from the base to the apex; anthers 0.5 × 0.5 mm, pale yellow apically but deep red toward the base, ± oblong to somewhat rectangular in outline, ± rounded apically with a ventrally inclined pore; connective crimson-maroon but drying purple-black, thickened and ± truncate ventrally at the base of the anther sac but not prolonged or appendaged. Ovary completely inferior, 3-locular, apex glabrous and 10-costate. Style straight, glabrous, 2–2.5 mm long; stigma truncate to ± rounded. Berry changing through green, red, blue, and ultimately black when ripe, 4–5 × 4–5 mm when dry. Seeds ± obovoid in outline, 1 mm long, tuberculate on the broader distal end.

Phenology. Collected in flower and fruit from February through April and in September and November.

Distribution. Local and uncommon in open areas in cloud forests and lake margins from disjunct localities in western and central Panama to southern Colombia and northern Ecuador at 700–1300 m. The label on a collection from Carchi, Ecuador (*Tipaz et al.* 1035), gives the elevation as 3200 m. This is extraordinarily high for this species and should be regarded with suspicion until confirmed.

In the protologue, this species was reported only from Colombia. It was first collected in Ecuador in 1979. Although it wasn't included in Wurdack's (1980) melastome treatment for Ecuador, it was reported from that country shortly thereafter (Wur-

dack, 1982: 61). The range of *C. garciabarrigae* is here extended north to Panama, making it the most widespread member of the goblet-flowered species of *Clidemia*.

Clidemia garciabarrigae differs from the other two species treated here in having an indument of smooth, spreading hairs on both foliar surfaces, leaf blades that are conspicuously dimorphic in size and shape at each node, and an inflorescence that typically consists of trifurcate (sometimes varying to solitary) racemes. It also differs from both congeners by its floral bracteoles that are widest well above the base.

Representative specimens examined. ECUADOR. **Carchi:** El Pailon, ca. 45 km below Maldonado along a footpath to Tobar Donoso, 2 Nov. 1979, *Madison & Besse* 7093 (US); Cantón Parroquia Chical, sector Gualpi medio, Reserva Indígena Awá, sendero a San Marcos al norte de la casa comunal, 78°16'W, 01°02'N, 23–27 May 1992, *Tipaz et al.* 1035 (CAS, MO). **Esmeraldas:** San Lorenzo Cantón Reserva Indígena Awá, cañon del Río Mira, 10 km al oeste de Alto Tambo, 78°26'W, 01°02'N, 16–26 Mar. 1991, *Rubio et al.* 1227 (US). **Pichincha:** Road El Paraíso–Saguangal, 11 km from El Paraíso, 78°46'W, 0°12'N, 2 May 1982, *Øllgaard et al.* 37666 (CAS). PANAMA. **Chiriquí:** Edwin Fabrega Dam and Reserve in Fortuna, Quebrada Bonita ca. 7.5 km N of Sitio de Presa office enroute to Chiriquí Grande, 5 Feb. 1996, *Almeda et al.* 7504* (BM, CAS, INB, MO, MEXU, PMA); Gualaca-Chiriquí Grande, 4–8 mi. beyond IRHE facilities at Dam, 4 mi. N of bridge over Bayano Lake, 8°46'N, 82°16'W, 23 Sep. 1987, *Croat* 68019 (CAS, MO, PMA); Fortuna Lake, cleared forest on banks of lake, 8°45'N, 82°12'W, 20 Mar. 1985, *Hampshire & Whiteford* 738 (CAS, MO); Fortuna, camino de Quebrada Bonita llegando por el embalse hacia el norte, 8 Apr. 1987, *Valdespino et al.* 596 (CAS, PMA). **Coclé:** forested slopes above El Copé along abandoned road leading to the Continental Divide, 25 Feb. 1988, *Almeda et al.* 5944 (CAS).

3. *Clidemia utleyana* Almeda, Bull. Torrey Bot. Club 106: 189. 1979. TYPE: Costa Rica. Cartago: continuation of C.R. #224 on the property of ICE hydroelectric plant (now Tapantí National Park), about 4.4 km beyond main gate to property and 17 km beyond the Church in Orosí, elev. 1500–1800 m, 13 Dec. 1975, *F. Almeda & J. Utley* 2666 (holotype, CAS; isotypes, CR, F, MO, US).

Laxly branched erect to reclining terrestrial or epiphytic shrub mostly 0.5–1.5 m tall. Internodes and uppermost branchlets terete, moderately to copiously beset with smooth, eglandular, spreading hairs mostly 1–2 mm long like the inflorescence rachis. Leaves of a pair somewhat unequal in size, otherwise identical in shape and indument details, blades chartaceous to subcoriaceous when dry, entire but conspicuously revolute, narrowly ovate to

\pm cordate, 5- to 7-nerved, glabrous and bullate adaxially, the abaxial surface beset with a mixture of smooth spreading hairs and sessile glandular hairs largely confined to the elevated primary and secondary veins; petioles 1.5–3 mm long or the blades occasionally subsessile and \pm clasping. Larger leaf at each node 4–10 \times 1.5–4.5 cm. Smaller leaf (2–)3–6 \times 1–4 cm. Inflorescence a terminal modified dichasium 1.5–2.5 cm long becoming pseudolateral with elongation of lateral branches; bracteoles linear-lanceolate to subulate, persistent, 2–4 \times 0.5 mm, beset with spreading simple hairs and sessile glandular-punctate hairs abaxially or essentially glabrous and then tipped with an apical hair. Pedicels (at anthesis) 0.5–1 mm long. Hypanthia (at anthesis) campanulate, 1–1.5 mm long from the base to the vascular ring, sparsely covered with smooth spreading hairs and a ground layer of scattered glandular-punctate hairs. Calyx tube 0.25 mm long, the calyx lobes 1 \times 1 mm, rounded-triangular, somewhat hyaline and obscured by the exterior teeth; calyx teeth 5, lance-triangular to \pm setiform, 0.25–0.5 \times 0.25 mm. Petals 5, glabrous, dark red, ovate to narrowly obovate, minutely glandular-ciliolate, erect, connivent and concave adaxially at anthesis, 1.5–2 \times 1–1.5 mm. Stamens 10, isomorphic and forming an incurved circle around the style; filaments glabrous, 1–1.5 \times 0.5 mm, subulate; anthers 0.5 \times 0.25 mm, pale yellow flushed with red along the connective dorsally and basally at the filament insertion, oblong to obovoid in outline, \pm truncate distally with a ventrally inclined pore; connective thickened dorso-basally but not dilated or prolonged below the thecae. Ovary completely inferior, 3-locular, apex glabrous and 10-costate. Style straight, glabrous, 2 mm long; stigma truncate. Berry dark purple at maturity, 4–4.5 \times 4–5 mm. Seeds narrowly pyriform, 1 mm long, \pm papillate on the broader distal end.

Phenology. Collected in flower and fruit from November through February and from June through August.

Distribution. Rare and local in cloud forests and ridgetop elfin vegetation in seepage areas, partially shaded vertical banks, and secondary thickets from central Costa Rica disjunctly south to western Panama with one known population in western Colombia from 1090 to 1800 m.

Among the three goblet-flowered species, *C. utleyana* is most similar to *C. garciabarrigae* but differs most notably in its leaf blades that are glabrous and bullate adaxially. It also differs in its dichasial inflorescence and its floral bracteoles that are broadest at the base.

For an illustration of this species see Almeda (1979: 190).

Representative specimens examined. COLOMBIA. **Chocó:** Carretera Ansermanuevo/San José del Palmar, 8.4 km del Alto del Galápago, 19 Feb. 1977, *Forero et al.* 3015 (COL). COSTA RICA. **Cartago:** Refugio Nacional de Vida Silvestre Tapantí, Sendero Oropendola and vicinity, approximately 1.2–2.7 km from the reserve entrance, 1 Mar. 1991, *Almeda et al.* 6864* (AAU, BM, CAS, CR, INB, MEXU, MO, NY, PMA); Tapantí Hydroelectric Reserve along Río Grande de Orosí, 4.5 km beyond small bridge which crosses river inside the preserve, along road to diversion dam, 23 June 1976, *Croat* 36084 (CAS). **Heredia:** Parque Nacional Braulio Carrillo between Río Peje and Río Sardinal, Atlantic slope of Volcán Barva, 10°15.5'N, 84°05'W, 13 Nov. 1986, *Grayum & Herrera* 7877 (CAS, INB, MO). PANAMA. **Bocas del Toro:** Edwin Fabrega Dam and Reserve in Fortuna along the Continental Divide Trail, 12.9 km N of Sitio de Presa offices above the Dam, 08°45'04"N, 82°15'04"W, 7 Feb. 1996, *Almeda et al.* 7534 (CAS, MO, PMA). **Chiriquí:** Edwin Fabrega Dam and Reserve in Fortuna, Quebrada Bonita ca. 7.5 km N of Sitio de Presa offices enroute to Chiriquí Grande, 5 Feb. 1996, *Almeda et al.* 7503 (CAS, PMA). **Veraguas:** summit of Cerro Tute with low windswept fog-shrouded elfin vegetation, 18 Feb. 1996, *Almeda et al.* 7629 (CAS, PMA).

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